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FINAL REPORT

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DEMONSTRATION OF SILAGE CORN AND BARLEY PRODUCTION SEEDED WITH A MODERN AIR DRILL IN THE BLACK SOIL ZONE

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Final Report

Demonstration of Silage Corn and Barley Seeded with a Modern Air Drill in the Black Soil Zone

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1. Summary

The objective of this project was to demonstrate the feasibility of growing early maturing silage corn in the black soil zone of Saskatchewan.

Roundup Ready, early maturing, hybrid corn was direct seeded using a Bourgault Coulter drill at an average seed depth of 2 in (5 cm) into wet loam soil at a corn seed rate of 30,000 kernels/ac (74,131 kernels/ha). Virden barley was seeded adjacent to the corn to compare the silage yield of both crops.

The corn crop established well, although it appeared rather patchy (plant distribution coefficient of variation (CV) of 107%) with an established plant population of 27,685 plants/ace (68,411 plants/ha).

Weed control was excellent in both crops and growing conditions were ideal with 9.85 in (24.6 cm) of rainfall during the May to September growing season.

A large sign was erected in front of the demo to promote the site and the field was toured on August 1 in cooperation with Saskatchewan Agriculture, Food and Rural Revitalization, and the Saskatchewan Soil Conservation Association.

Corn silage dry weight was 3.2 tons/ac (7.17 tonnes/ha) compared to 3.6 tons/ac (8.06 tonnes/ha) for the Virden barley. As the forage yield potential for corn is much higher than for barley and growing conditions for the corn were excellent, the corn yield was disappointing. Although it is difficult to draw conclusions on the basis of one site in one year, the large variance in corn plant spacing may have contributed to the relatively low corn yield.

2. Project Objective

2.1 Background and Objectives

With the development of early maturing, herbicide tolerant corn hybrids, there is the potential to significantly increase the yield and production of silage in Saskatchewan. High quality corn silage has the potential to reduce feed costs and increase livestock production in Saskatchewan.

The objective of this project was to demonstrate the feasibility of growing early maturing silage corn in the black soil zone of Saskatchewan.

2.2 Project Description

Land was selected north and west of St. Brieux on cooperator Dan Stevenson's land near HiLite Custom Feedlot (SW35-43-21-W2).

The corn was direct seeded into standing stubble on May 19 on 21.3 ac (8.6 ha) of level loam soil using a Bourgault 5725, 40 ft, 8 in wide coulter drill at 9.8 in (24.9 cm) row space with mid row banders. A tow-behind Bourgault 5440 air cart with twin fans was used in conjunction with the air drill. Phosphate fertilizer was seed placed and the nitrogen/sulphur fertilizer blend was mid row banded (**Figure 1**).

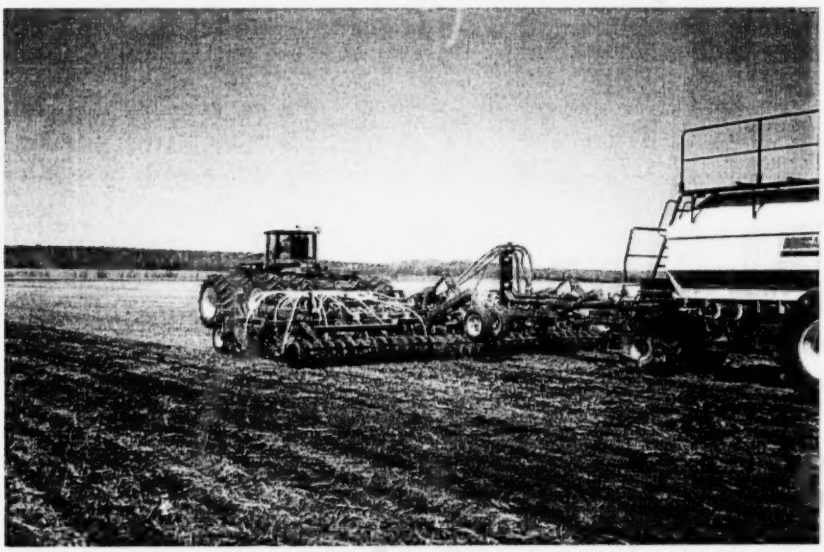

Figure 1. Bourgault 5725 Coulter Drill with 5440 Air Cart Seeding the Hybrid Corn.

Net seeding depth was about 2 in (5 cm) into wet soil. Prior to seeding, a Roundup burn off was applied to the site at a rate of 1 litre/ac.

The seed and fertilizer was power calibrated in the field and the calibrations were very closely correlated with the actual amount of fertilizer and seed applied to the site. Urea (46-0-0) and ammonium sulphate (20-0-0-24) were pre-blended at the fertilizer plant and applied at a rate of 295 lb/ac (331 kg/ha) of product, or 130 lb/ac (148 kg/ha) N and 9.8 lb/ac (10.9 kg/ha) S. The target application rate was 305 lb/ac (342 kg/ha) of product, but the top end rate with the meter was 295 lb/ac (331 kg/ha), and as it was close to target, we did not change the meter. Seed placed 11-51-0 was applied at a rate of 50 lb/ac (56 kg/ha) product or 25 lb/ac (28 kg/ha) $P_2 0_5$. Roundup Ready Dekalb DKC27-12 hybrid corn (2,250 corn heat units) was seeded at a target rate of 30,000 kernels/ac (14.4 lb/ac). Actual seed rate turned out to be 30,047 kernels/ac (74,247 kernals/ha) based on 16 bags x 40,000 kernels/bag/21.3 acres. Seeding ground speed was 4.6 mph (7.4 k/hr).

Immediately adjacent to the corn demo, the farmer cooperator seeded Ranger and Virden barley, also for silage.

A second Roundup application was applied post-emergently to the Roundup Ready corn resulting in excellent weed control.

The corn crop established well, although it appeared somewhat patchy. Crop stage averaged about 5.5 leaves on June 18 compared to barley at the 3.5 leaf stage with an average of 2 to 3 tillers. Corn distribution was measured (distance between individual plants) was measured for 30, 32.8 ft (10 m) long rows to determine plant density and spacing.

A large sign was erected in front of the demo to promote the site (**Figure 2**).

Figure 2. Overview of the Corn Demo Site on August 19, 2003.

The corn demo was toured on August 1 organized in cooperation with Garry Mayerle of the Saskatchewan Soil Conservation Association and Al Foster of Saskatchewan Agriculture and Food. Turnout for the field day was very poor. Cooperator Dan Stevenson provided information on the demo and how it fits with his feedlot/farm operation. Small groups of people also toured the site with Soilutions Fertilizer and Bourgault Industries, both of St. Brieux.

The corn and barley progressed well in summer with high temperatures and adequate soil moisture (**Figure 3**).

Figure 3. Corn Crop on August 19, 2003.

As expected, the barley matured well before the corn, and a measured area was weighed, forage harvested, and ensiled prior to the corn harvest.

At harvest the corn averaged about 7 ft (2.1 m) tall with one large well-formed cob on each plant (**Figure 4**).

Figure 4. Corn Cob Maturity on October 2, 2003.

The corn required a killing frost before the moisture content dropped enough for making silage. On October 2 the corn was swathed very close to the ground with a SP swather immediately followed by a forage harvester that picked up the corn and transferred it to trucks (**Figures 5** and **6**).

Figure 5. Swathing the Corn with a SP Swather.

Figure 6. Forage Harvesting the Corn.

Each truckload was weighed prior to dumping in the horizontal silage pit at HiLite Feedlot.

2.3 Results and Discussion

Soil moisture conditions were excellent at seeding, and there was abundant precipitation after seeding. Precipitation by month at site:

May	2.2 in (5.5 cm)
June	2.7 in (6.75 cm)
July	2.05 in (5.03 cm)
August	1.8 in (4.5 cm)
September	1.1 in (2.75 cm)

Although the corn heat units were not measured, the summer was quite hot and likely sufficient for the corn's heat unit requirements.

The corn crop established well although it appeared patchy. Thirty, 32.8 ft (10 m) rows were counted and measured for distance between plants (**Appendix I**). The established plant population was 27,685 plants/ac (68,411 plants/ha) or 92% of the seeds planted. Distances between plants varied greatly resulting in an overall coefficient of variation of 107%. The high C.V. infers that the accuracy of distribution provided by the Bourgault metering/distribution system was the reason for the patchy plant establishment. However, it should be noted that the Bourgault metering/distribution system was designed for small grains and oilseeds and was not developed for seeding corn. Testing with cereals and oilseeds has indicated that the accuracy of distribution provided by the Bourgault metering/distribution system is very accurate with low C.V.'s. Therefore, these results do not indicate any performance problems with the Bourgault metering/distribution system.

Weed control from the pre-seed and post-emergent applications of Roundup was excellent with very few weeds visible in the corn crop.

Virden barley, located adjacent to the corn, produced 8.7 tons/acre (19.4 tonnes/ha) of wet silage at 41% dry matter or 3.6 tons/acre (8.1 tonnes/ha) dry matter. The corn produced 8.9 tons/acre (19.9 tonnes/ha) of wet silage at 36% dry or 3.2 tons/acre (7.2 tonnes/ha) dry matter. As the forage potential for corn is much higher than for barley and the growing conditions for the corn were excellent, the corn silage yield was disappointing. Although it is difficult to draw conclusions on the basis of one site in one year, it is possible that the large variation in corn plant spacing may have contributed to the relatively low corn silage yield. However, it should be noted that a related demonstration at Portage la Prairie, Manitoba, where air seeded corn was compared to precision planted corn, the silage yield from both seeding methods was similar. As a result of the conflicting results, it is recommended that the demonstration should be repeated for at least one more year to see if the 2003 results are truly representative.

Appendix I

Emergence Counts & Distribution of Corn in 30 x 10 m rows

5302G Corn Demo
Revised January 15, 2004

Number of plants in 10 metre row

19	25	18	19	27	14	13	14	15	12	15	16	16	14	18	16	9	20	15	15	18	13	29	22	21	16	21	25	24	22

Average 18.03333 CV (%) 26.43

In row spacing (Metres)

Average per row																													
0.53	0.40	0.56	0.53	0.37	0.71	0.77	0.71	0.67	0.83	0.67	0.63	0.63	0.71	0.56	0.63	1.11	0.50	0.67	0.67	0.56	0.77	0.34	0.45	0.48	0.63	0.48	0.40	0.42	0.45
Variance per row																													
0.26	0.22	0.29	0.17	0.13	0.20	0.56	0.59	0.46	0.24	0.35	0.23	0.34	0.40	0.42	0.40	2.48	0.34	0.43	0.61	0.59	0.87	0.30	0.14	0.28	0.26	0.34	0.20	0.14	0.26
CV (%) per row																													
97	117	81	79	98	63	98	108	101	59	88	76	93	89	117	102	142	117	99	117	138	121	160	82	112	82	123	111	88	112

Overall Average 0.55 Variance 0.36 CV % 107

Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7	Row 8	Row 9	Row 10	Row 11	Row 12	Row 13	Row 14	Row 15	Row 16	Row 17	Row 18	Row 19	Row 20	Row 21	Row 22	Row 23	Row 24	Row 25	Row 26	Row 27	Row 28	Row 29	Row 30
0.1	0.2	1.1	0.5	0.1	0.4	0.5	2.7	0.3	0.3	0.7	0	1.5	0.7	1	0	0.3	0.6	2.3	0	0.1	1.5	0.2	0.1	0.1	1.4	0.4	0.4	0.5	0
0.4	0.1	0.4	0.2	0.2	0.1	0.1	0.2	0.4	1.1	0.2	0.2	0.3	0	0.2	1.2	1.4	0.3	0.1	0.2	3.4	0.2	0.2	1.4	0.2	0.7	0.1	0.4	0.1	0.3
0.1	0.3	0.3	0.3	0.3	0.7	0.5	1.9	0.1	0.7	0.3	0.3	1	0.3	0.9	1.9	0.1	1.7	0.5	0.7	0.6	1.6	0.2	0.1	0.2	1.6	0.2	0.3	0.2	0.1
0.2	0.1	0.1	0.3	0.8	1.3	1.1	0.3	0.8	0.6	0.1	1.3	0.6	0.5	0.4	0.4	0.2	0.2	0.2	0	0.7	3.4	0.1	1	0	0.1	1.1	0.3	0.2	0.1
0.1	0	0.2	0.8	0.2	0.6	1.4	0.1	0.1	0.1	1.2	0.7	0.6	1.3	0.1	0.1	0.1	0.3	1.1	2.8	0.2	0.7	0.6	0.1	0.1	0.2	0.3	0.7	0.1	0.4
0.4	0.3	1.2	0.3	0.1	0.6	1	0.7	1.4	0.9	0.6	0.3	0.3	0.6	0.1	0.2	2.9	0.1	0.1	1.3	0.6	0	0.1	0.1	0.6	1.2	0.1	0.1	0	0.4
1.4	0.1	0.6	1.8	0.1	1	0.1	0.1	0.3	0.8	0.2	0.7	0.9	0.4	0.1	0.4	0.4	0.7	0.1	0.1	0.2	0.1	0.8	0	0	0.5	2.6	0.2	0.3	0.2
0.1	0.1	1.3	0.7	0.1	1.1	0.2	0.6	0.5	1.1	1.4	0.5	0.3	1.6	0.1	0.1	0.1	0.3	0.5	1.1	0.1	0.3	0.4	0.1	2.1	0	0.1	1.9	0.4	0.2
0.6	2.1	0.2	0.1	0.1	0.1	1.1	0.7	0.1	1.9	0.7	0.7	0	0.4	0.1	0.6	4.5	0.4	1.6	0	0.3	0.7	0.3	0.3	0.3	0.4	0.2	0.3	0.3	0.5
1	0.7	0.1	0.6	0.1	0.4	0.1	1.3	0.2	1.2	1.6	1.7	0.1	0.3	1.7	1.6		0.2	0.3	1.6	0.1	0.6	1.1	0.3	0.3	0	0.1	0	0.3	1
1.6	0.7	0.2	0.3	1	1.5	1.1	0.1	1.3	0.8	0.6	0.7	2.2	1	0.4	1.8		0.1	0.8	0.8	0.2	0.4	1.8	0.7	0.2	0.5	0.8	0	1	0
1.5	0.4	0	0.6	0.9	1.1	0.1	0.8	2.3	0.2	1.9	0.6	0.2	2.3	0.2	0.4		2.4	0.2	0.1	0.2	0.3	0.1	0.3	0.1	0.3	0.2	0.3	0	0.7
0.3	1.3	0.3	0.3	0.2	0.9	2.7	0.3	1.6		0.2	0.7	0.4	0.2	0.1	0.5		0.7	0.8	0.6	0.9	0.2	0.1	1.2	1.3	1	0.2	0	0.6	0.1
0.7	0.1	1	0.4	0.1	0.2		0.2	0.5		0.1	1.3	0.3	0.4	0.4	0.2		0.5	1.3	0.6	0.2		0.1	0.4	0.1	0.1	0.8	0	0.1	2.3
0.3	0.1	1.3	0.4	0				0.1		0.2	0.3	0.3		0.4	0.5		0.4	0.1	0.1	0.7		0.2	0.4	0.4	0.4	0	0.4	0.9	0.1
0	0.5	0.8	0.4	0.1							0	1		0.9	0.1		0.1			0.3		0	0.3	0.7	1.3	0.2	0.5	1.4	0.3
0.1	0	0.6	1.3	0.2										2.5			0.7			0.2		0	0.5	0.6		0	0.1	0.2	0.6
0.8	0.6	0.3	0.1	1.5										0.4			0.1			1		0.3	0.5	0.3		0.6	0.7	0.2	0.1
0.3	0.1		0.6	0.7													0.1					0.3	0.3	0.7		0.5	0.1	0.6	0.7
	0.3			0.4													0.1					0.1	0.6	0.3		0.5	0.2	0.1	1
	0.3			0.5																		0	0.8	1.4		1	0.6	0.6	0.3
	0.4			0.1																		0.1	0.5				0.7	1.1	0.5
	0.1			0.5																		2.4					1.4	0.3	
	0.8			0.7																		0.3					0.1	0.5	
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